

ORIGINAL

BEFORE THE
Federal Communications Commission
WASHINGTON, D.C. 20554

ORIGINAL
FILE

In the Matter of

Amendment of Section 2.106 of
the Commission's Rules to
Allocate the 1610-1626.5 MHz
and the 2483.5-2500 MHz Bands
for Use By The Mobile-Satellite
Service, Including Non-
Geostationary Satellites

ET Docket No. 92-28
RM-7771 PP-29 PP-32
RM-7773 PP-30 PP-33
RM-7805 PP-31
RM-7806

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

REPLY COMMENTS OF TRW INC.

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SUMMARY

The Commission proposed in its Notice of Proposed Rule Making and Tentative Decision ("Notice and Tentative Decision") in this proceeding to allocate the 1610-1626.5 MHz and 2483.5-2500 MHz frequency bands (the "RDSS Bands") to the mobile-satellite service ("MSS") on a co-primary basis. This proposal has received virtually unanimous support from the parties filing comments in response to the Notice and Tentative Decision. No filer opposed the allocation. In light of this overwhelming agreement, the Commission should act expeditiously to make the allocation as proposed, in a manner that will facilitate multiple service providers in an open entry environment.

There are, of course, myriad other issues upon which a number of the commenting parties disagree. The most critical of these is the question which of the proposed spectrum access methods will facilitate the goal of permitting multiple service providers to share the allocated frequencies. TRW believes that the four applicants proposing spread spectrum sharing techniques have proven conclusively that this method is superior to the others advanced. The channel capacity made possible through use of spread spectrum modulation will permit service to approximately as many users as either of the competing sole-provider proposals advocated by Motorola and AMSC, while also guaranteeing to the public the indisputable benefits of competition.

By contrast, neither Motorola nor AMSC has advanced a proposal which can comply with the Commission's policy of promoting competition and open entry in the RDSS bands. In addition, Motorola has not demonstrated that its proposal to utilize the secondary allocation to operate bi-directionally in the 1616-1626.5 MHz segment of the L-Band is actually feasible given near-term international demands for the primary allocation, and the inherent limitations of secondary operation. For its part, AMSC has not shown that the proposed expansion of its domestic geostationary MSS system could either comply with the international interference restrictions applicable in the L-Band or provide service to hand-held transceivers, as the other applicants propose to do.

Turning to the issues concerning sharing with other services, TRW's spread spectrum Odyssey system can successfully share spectrum not only with other spread spectrum systems, but also with other L-Band users such as the radio astronomy service and the Global Navigation Satellite System, as well as with terrestrial users in the S-Band. Although there is not yet precise agreement on the best mechanisms for protecting these co-primary users, there is every reason to believe that satisfactory accommodations can be reached. Similarly, the handsets proposed for use with LEO MSS systems are of sufficiently low power that they will pose no human health hazard. In any case, because these issues concern the manner in which the Commission should implement service or condition its implementation, their

resolution can and should be fully considered in the companion technical and service rules proceeding in CC Docket No. 92-166.

Finally, the Commission acted appropriately in declining to award a pioneer's preference in this proceeding, and its Tentative Decision should be affirmed. Although TRW would be the logical recipient of such a preference, it believes that the outstanding questions concerning the lawfulness of the procedure in this circumstance, i.e., where other mutually-exclusive applications necessarily would be denied, outweigh any benefit that might accrue from such a grant. Motorola's claim to such a preference is particularly weak in light of the fact that was not the developer of the technologies it employs and the fact that the "overall service concept" that it touts has not been proven viable. Its claims should once again be rejected.

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To: The Commission

REPLY COMMENTS OF TRW INC.

TRW Inc. ("TRW"), by its attorneys and pursuant to Section 1.415 of the Commission's rules, hereby replies to various comments submitted pursuant to the Commission's Notice of Proposed Rule Making and Tentative Decision in the above-captioned docket, 7 FCC Rcd 6414 (1992) ("Notice and Tentative Decision"). In the Notice and Tentative Decision, the Commission proposed to allocate the 1610-1626.5 MHz and 2483.5-2500 MHz bands, currently allocated to the radio-determination satellite service ("RDSS"), to the mobile-satellite service ("MSS") on a co-primary basis. In particular, the Commission cited systems utilizing low-Earth orbit ("LEO") and other non-geostationary satellites as potential providers of "a wide range of new and low-cost services, with a potentially worldwide scope, such as voice, facsimile and data messaging, and fleet surveillance and control." Notice and Tentative Decision, 7 FCC Rcd at 6414.

I. INTRODUCTION

In response to the Notice and Tentative Decision, ten parties -- including TRW -- filed comments in this proceeding. The parties filing comments expressed overwhelming support for adoption of the proposed allocation. See, e.g., Comments of the American Petroleum Institute ("API") at 4; Comments of AMSC Subsidiary Corporation ("AMSC") at 1; Comments of Communications Satellite Corporation ("COMSAT") at 1; Comments of Loral Qualcomm Satellite Services, Inc. ("LQSS") at 3; Comments of Motorola Satellite Communications, Inc. ("Motorola") at 3-4. Indeed, no commenter opposed the allocation.

To the extent that questions, concerns, or differences of opinion were raised concerning allocation of these bands, none should prevent the Commission from acting favorably on its allocation proposal. Indeed, all of these points of contention concern the manner in which the Commission should implement or condition the implementation of the service. As such, these matters are more appropriate for consideration in the Commission's companion rulemaking proceeding in CC Docket No. 92-166 to develop technical and service rules for the LEO MSS service in the RDSS bands.

With respect to challenges made by those parties seeking to usurp the MSS/RDSS bands for their sole use, the Commission long ago determined that competition among multiple providers operating in the RDSS bands is in the public interest.

See Amendment To The Commission's Rules To Allocate Spectrum For, And To Establish Other Rules and Policies Pertaining To, A Radiodetermination Satellite Service, 104 F.C.C.2d 650 (1986) ("RDSS Licensing Order"). The Commission reaffirmed this approach in the Notice and Tentative Decision (see 7 FCC Rcd 6417), and it has received strong support from commenters in this proceeding as well. See, e.g., Comments of API at 5. Neither Motorola's attempts to refute this conclusion,^{1/} nor AMSC's implication that the minimal intermodal competition it might receive from service providers operating in other bands would provide sufficient user options, should be permitted to alter or cloud this view.

Thus, in light of the widespread agreement on the central issue of allocating these bands, the Commission should act expeditiously to make the allocation as proposed -- in a manner that will permit multiple providers in an open entry environment -- and refer the implementation issues to the ongoing technical and service rules proceeding in CC Docket No. 92-166.

^{1/} Motorola's arguments to encourage abandonment of this policy are based on precedents that have no relevance to this proceeding. See Motorola Comments at 17-18. Having determined that competition in these bands is both viable and beneficial, the Commission need not revisit this policy decision here. See Consolidated Opposition to Petitions to Deny And/Or Dismiss and Reply Comments of TRW Inc., File Nos. 20-DSS-P-91(12) and CSS-91-015, et al., at 26-27 (filed January 31, 1992).

II. SPREAD SPECTRUM SHARING TECHNIQUES WILL PROMOTE THE IMPERATIVE OF MULTIPLE ENTRY AND COMPETITION CONSISTENT WITH THE INTERNATIONAL AGREEMENTS REACHED CONCERNING USE OF THE SUBJECT FREQUENCY BANDS.

In the Notice and Tentative Decision, the Commission requested comment on the ability of several service providers to share frequencies in the S-band and the L-Band, and which of the proposed access methods is most likely to facilitate this goal. See 7 FCC Rcd at 6416-17. In response, several parties have provided additional evidence of the compatibility of multiple systems utilizing spread spectrum sharing techniques. See, e.g., TRW Comments at 10-13; LQSS Comments and Appendix A thereto.

A. Spread Spectrum Will Provide The Benefits Of Competition and Permit Service To The Maximum Number Of Potential Users.

Contrary to the implication raised by Motorola and AMSC (see AMSC Comments at 15; Motorola Comments at 13), no party has claimed that spread spectrum permits limitless sharing of finite spectrum. The "ghost" of "CDMA limitless spectrum sharing" is a specter created by Motorola, not by TRW or any of the other applicants. See Technical Appendix hereto at A-5.

Nevertheless, while not limitless, the channel capacity made possible through use of spread spectrum will enable the provision of service to as many or more users than either of the proposed monopoly systems, while also guaranteeing to the public the indisputable benefits of competition. This is the principal advantage claimed by TRW and the other parties to this proceeding

proposing to employ CDMA technology. Even if Motorola could somehow overcome the imposing technical obstacles that face its Iridium system and live up to its claimed ability to serve more users than the spread spectrum systems, it cannot overcome the fact that the extravagant cost and unnecessary scope of its monopoly system would result in both far higher charges to consumers and international discord without providing users with the beneficial opportunity to choose among competing service providers.

As TRW has amply demonstrated on prior occasions, the spread spectrum channel capacity limitations once again postulated in the Motorola and AMSC filings are based upon wholly erroneous assumptions. See, e.g., Consolidated Opposition to Petitions to Deny and/or Dismiss and Reply Comments of TRW Inc., File Nos. 20-DSS-P-91(12) and CSS-91-015, et al., at 21-28, and Technical Appendix thereto (filed January 31, 1992); Consolidated Response of TRW Inc., File Nos. 20-DSS-P-91(12) and CSS-91-015, et al., at 14-19, and Technical Appendix thereto (filed March 27, 1992). Motorola's persistent refrain that the "non-homogeneity" of the spread spectrum systems, as now proposed, will prevent these systems from achieving viable capacities continues to be a specious claim.

In reiterating this assertion, Motorola again ignores the recognized ability of multiple spread spectrum systems to coordinate their operations in order to achieve maximum sharing

efficiency. As Motorola -- which has twice amended its application -- must recognize, no applicant is barred from making minor amendments that improve the efficiency of its system design or, more specifically, that promote the realization of the public-interest benefits of open entry. Nevertheless, the "non-homogeneity" argument it advances implicitly asks the Commission to overlook this capability, and seeks to penalize all other applicants and the public-at-large because the spread spectrum applicants "failed" to propose identical systems in the first instance. The conclusions reached by Motorola, tainted as they are by the illogic of its initial premise that the systems proposed by the spread spectrum applicants are incapable of being operationally harmonized, remain without credibility.

Similarly, Motorola's comparisons consistently ignore the fact that channels available to the spread spectrum systems must be considered in the aggregate. To the extent that the limitation of available spectrum may result in slightly less capacity per system than each applicant initially projected for itself in a single-spread spectrum system environment, this is no disadvantage with respect to overall efficiency. The aggregate capacity of spread spectrum systems in the RDSS/MSS bands will still approximate that of Iridium. See Technical Appendix hereto at A-5.^{2/}

^{2/} Moreover, each of the spread spectrum systems can be viable in a multiple system environment because the number of
(continued...)

An allocation premised on the ability of compatible systems to share has an additional advantage over monopoly systems. Because the capacity of spread spectrum systems is limited by the total amount of noise in the bands, upon the future abandonment or down-scaling of one or more systems, existing systems would be able to adjust their usage of the bands to achieve an equitable allocation of the capacity. See Technical Appendix at A-9. This adjustment would be accomplished dynamically and without interruption in service, system changes, or the need for any re-allocation of spectrum. By contrast, if either Motorola or AMSC is granted exclusive access to the bands, delay or abandonment of their systems would leave the bands fallow, and would deprive the public of all benefits of MSS services.

Only the proposed spread spectrum systems can implement MSS service efficiently, competitively, and in accordance with international regulations.^{3/} The Commission should conclude

^{2/}(...continued)

users that must be served in order to achieve profitability is far less -- even in the aggregate -- than the corresponding number for Motorola's multi-billion dollar system.

^{3/} Indeed, while AMSC claims not to be opposed to competition, it proceeds to identify as its potential competition, in a world without MSS/RDSS systems, only alternative communications media (e.g., terrestrial cellular systems, SMR operators, and even data-only "Little LEO" systems). See AMSC Comments at 9-10. The type of competition that the Commission is committed to fostering in these bands is intramodal competition, not the types of limited intermodal "competition" referred to by AMSC.

that spread spectrum systems can provide all of the same services that AMSC or Motorola could provide, including any and all public safety applications, more reliably and at lower cost to the public.

B. AMSC's Attempted Spectrum Grab For Its Planned Geostationary MSS System Offers None Of The Benefits Available Through Multiple Spread Spectrum Systems.

AMSC once again entreats the Commission to cede to it two-thirds of the RDSS uplink band to satisfy its seemingly insatiable lust for L-band spectrum. See AMSC Comments at 7.^{4/} Regardless of the merits of AMSC's other pending requests for additional spectrum, it is clear that AMSC's system, as proposed, cannot share with the non-geostationary MSS systems and should not be authorized in the RDSS bands.^{5/}

^{4/} AMSC is not only a participant in this proceeding, but is authorized to utilize 28 MHz of MSS L-Band spectrum and has separately applied for authority to utilize 35 MHz of spectrum in the Maritime-Mobile Satellite bands for its domestic geostationary system. See TRW Petition to Deny or Dismiss (File Nos. 15-DSS-MP-91 and 16-DSS-MP-91, at 15 (filed December 18, 1991)). Moreover, in comments concerning the Digital Audio Radio Service ("DARS") application of Satellite CD Radio, Inc., AMSC proposes that a portion of the spectrum now proposed for allotment to DARS be allotted instead to aeronautical telemetry so that, in turn, a portion of the 1492-1525 MHz band allotted for that use could be used by AMSC. See Comments of AMSC, File Nos. 49/50-DSS-P/LA-90, et al. (filed November 17, 1992).

^{5/} In light of the Commission's continued consideration of AMSC's geostationary satellite proposal, CELSAT's assertion that the Commission is predisposed to non-geostationary systems (see CELSAT Comments at 5-6) clearly is absurd. The Commission properly rejected CELSAT's geostationary
(continued...)

Specifically, the uplink EIRP density limit of -3 dBW/4 kHz adopted in Footnote 731X to the international Radio Regulations, and now proposed for domestic adoption, effectively precludes AMSC's geostationary satellite system from utilizing these bands. See Technical Appendix hereto at A-2 to A-3; Consolidated Response of TRW at 24-25 (filed March 27, 1992). See also TRW Petition to Deny or Dismiss at 16 (filed December 18, 1991). Ironically, AMSC attempts to use potential interference to both GLONASS and the Radio Astronomy Service ("RAS") as a sword (see Section III, infra), yet it fails even to make the claim, let alone provide a demonstration, that its own proposal could comply with applicable interference restrictions in the L-Band.^{6/}

^{5/} (...continued)

RDSS-band rulemaking alternative in the Notice and Tentative Decision, while CELSAT's primary request for rule making remains pending. Although CELSAT has petitioned for reconsideration of the Commission's rejection of this portion of its request, CELSAT's contention that no party opposed the petition is curious. As CELSAT well knows, TRW has sought dismissal of this petition because there is no procedural basis upon which the Commission may consider it. See TRW Petition to Dismiss (filed October 28, 1992).

^{6/} It is clear that AMSC is incapable of sharing the former RDSS bands. Therefore, although TRW does not take a position on the proposal of some commenters that the Commission should preclude geostationary satellite systems from providing MSS services in the former RDSS bands (see, e.g., Comments of Ellipsat Corporation at 5-7), it agrees that the Commission must dismiss AMSC's application for these bands. Moreover, to the extent that AMSC "offers" to embrace CDMA modulation if required to do so by the Commission, TRW observes that this offer is unaccompanied
(continued...)

Despite its attempts to convince the Commission otherwise, there is no basis for AMSC's broad statement that its system would "provide all the beneficial services proposed by the non-geostationary MSS applicants." See Comments of AMSC at 9. To the contrary, geostationary systems such as AMSC's will have great difficulty offering service to hand-held transceivers, one of the principal service benefits contemplated by the Commission, because of the tremendous satellite size and power required to reach such units from such high orbits. See Comments of Constellation Communications, Inc. ("Constellation") at 3. AMSC's contention that its "second generation of satellites" will offer such benefits (see AMSC Comments at 9) contradicts its claims as to the breadth of its applied-for service offerings, and is, at best, rank speculation. Id.

Similarly, as TRW has previously observed, AMSC has never proposed to offer genuine RDSS service in the subject bands, contrary to the rules in effect currently and at the time AMSC applied for the frequencies. See 47 C.F.R. § 25.141(d). Because the AMSC system would not itself determine an object's position "by means of the propagation properties of radio waves," it does not propose to offer any service that falls within the

^{6/}(...continued)

by any technical showings, is inconsistent with AMSC's vitriolic attacks on CDMA modulation, and is highly (if not impossibly) conditional. It cannot save AMSC's application from dismissal.

internationally accepted definition of RDSS. See ITU Radio Regulations, RR-1, 1.8. See also TRW Petition to Deny or Dismiss, File Nos. 15-DSS-MP-91 and 16-DSS-MP-91 (filed December 18, 1991), at 19-22.

Finally, it has never been clear how and when AMSC would be able to utilize the RDSS frequencies it seeks. Although AMSC asserts that it will be able to provide service with the launch of its first satellite in 1994 (see AMSC Comments at 8), this satellite is not one of the satellites with potential capability to expand use into the RDSS L-Band segment, and is not the subject of AMSC's RDSS-band applications and rulemaking proposal.^{7/} Moreover, the second and third satellites proposed by AMSC were not initially designed with sufficient power to make use of the additional spectrum sought without dramatically reducing utilization of the frequencies already allotted for use by AMSC's MSS system. See Consolidated Response of TRW (filed March 27, 1992) at 25-26. Thus, even if these satellites are ultimately made operational, AMSC cannot effectively use the RDSS L-Band spectrum it seeks to usurp without substantially increasing system power -- along with system costs and potential

^{7/} On July 31, 1991, AMSC requested that the Commission extend the construction and launch milestone dates for these two satellites, AMSC-2 and AMSC-3. See Application of AMSC, File No. 32/33-DSS-ML-91 (filed July 31, 1991). Subsequently, it sought a further extension, until January 1993, of the milestone for commencement of construction. See Public Notice, Report No. DS-1226 (released August 26, 1992).

interference to other spectrum users. See Technical Appendix hereto at A-8. In other words, AMSC's claimed cost economies for incorporating RDSS frequencies into its system are not credible.

C. Motorola's Bi-Directional Scheme Is Unworkable.

In its Comments, Motorola once again touts bi-directional operation in the L-Band as its peculiar panacea to spectrum limitations. See Motorola Comments at 11-12. Although the 1613.8-1626.5 MHz band is now allocated internationally for space-to-Earth links on a secondary basis, that fact alone does not answer the Commission's question whether such a use is technically viable in conjunction with the primary Earth-to-space allocation. Indeed, several commenters have opposed domestic adoption of the secondary allocation because the actual long-term operation of a bi-directional system is, at best, problematic. See Constellation Comments at 5-6; LQSS Comments at 12-14; Ellipsat Comments at 11-12. In fact, as Constellation points out, bi-directional transmission by MSS systems in the L-Band has been rejected in the past by the Commission as technically infeasible. See Amendment of Part 2 of the Commission's Rules to Allocate Spectrum for Mobile-Satellite Services in the 1530-1544 MHz and 1626.5-1645.5 MHz Bands, 5 FCC Rcd 1255, 1258 (1990); Constellation Comments at 6 and n.9.

Motorola's claims to unique spectral efficiency, as well as its companion attacks on the relative sharing

capabilities of the spread spectrum applicants, have been shown by TRW and others to be completely without merit. See Consolidated Opposition of TRW, File Nos. 20-DSS-P-91(12) and CSS-91-015, et al., at 21-28, and Technical Appendix thereto (filed January 31, 1992); Consolidated Response of TRW, File Nos. 20-DSS-P-91(12) and CSS-91-015, et al., at 14-19, and Technical Appendix thereto (filed March 27, 1992). See also Technical Appendix hereto at A-8 to A-9. In particular, Motorola's proposed bi-directional operation does not enhance spectral efficiency; it wastes spectrum by leaving the paired S-band spectrum unusable without allocation of scarce additional spectrum.^{8/} Moreover, Motorola's efficiency claims completely ignore the fact that it will require excessively large guard bands between transmit and receive time slots to have any hope of achieving synchronization. See TRW Comments at 14-15; Technical Appendix hereto at A-8.

In short, the claim that Iridium would achieve unique spectrum efficiency is itself an illusion. See Technical Appendix at A-9. It is possible, as Motorola has shown, to trade link power against modulation scheme to demonstrate on paper a system with outstanding spectral efficiency, albeit one with totally impractical or economically infeasible design. Claims of spectrum efficiency through bi-directional operation must

^{8/} When the additional 200 MHz of spectrum that Motorola will require for satellite cross-links is considered, Iridium is one of the least spectrum efficient systems proposed.

therefore be weighed very carefully against other characteristics.

D. Motorola's Alternative Schemes To Gain Access To Exclusive Spectrum Lack Any Credibility.

1. Band Segmentation

In its Comments, Motorola once again suggests that the Commission might accommodate multiple service providers by carving up the current RDSS allocation, offering the upper two-thirds of the L-Band allocation to Motorola to implement Iridium as proposed, and requiring all of the other applicants to change their proposals to utilize in some way the left over frequencies or completely different bands. This proposal also has been submitted to the Commission in the form of a Petition for Rule Making, but has never been officially accepted or placed on notice for public comment. See Motorola Petition for Rulemaking (filed September 22, 1992).

Fragmentation of the RDSS bands as proposed by Motorola would make a shambles of the gains made by the U.S. in securing this spectrum for worldwide MSS/RDSS operations. Turning over such a prime band segment for Motorola's exclusive use would leave all other potential systems, domestic and international, with spectrum remnants that no other applicant can realistically utilize,^{9/} and Motorola's use would inevitably be precluded by

^{9/} For example, it leaves 6 MHz of uplink spectrum paired with a full 16.5 MHz of S-band downlink spectrum.

the establishment of international systems that utilize the primary, uni-directional MSS allocation. See 47 C.F.R.

§ 2.104(d)(4) (stations of a secondary service shall not cause harmful interference to, and cannot claim protection from harmful interference from, stations of primary or permitted services to which the subject frequencies are already assigned or to which they may be assigned in the future).

In addition, the spectrum division envisioned by Motorola is squarely contrary to the established pro-competitive policy that currently governs these bands -- a policy that has consistently been reaffirmed by the Commission. See TRW Comments at 2-3, 18-19. This policy mandates the opportunity for competitive multiple entry in these frequencies. In particular, Section 25.141(e) of the Commission's rules unequivocally states that "[e]ach radiodetermination satellite service licensee will be assigned the entire allocated frequency bands on a non-exclusive basis." 47 C.F.R. § 25.141(e) (emphasis added). This reflects the Commission's well-established conclusion that multiple entry in these bands can best be accomplished through full-spectrum sharing rather than band segmentation. See RDSS Licensing Order, 104 F.C.C.2d at 660-661.

2. Alternative Bands

In a footnote, Motorola also reintroduces an equally self-serving proposal to relegate CDMA applicants to alternate

frequency bands at 1675-1710 MHz and/or 1599.5-1610 MHz. See Motorola Comments at 16-17 n.26 (citing Motorola's Petition for Rule Making (filed September 22, 1992)). Essentially, Motorola proposes to preclude TRW and the other spread spectrum applicants from the 1610-1626.5 MHz band, where the MSS use that they propose falls within the worldwide co-primary allocation, in order that Motorola may implement in a portion of that band a system that may operate internationally on only a secondary basis. The patent outrageousness of Motorola's proposition is only heightened by the fact that neither of the bands proposed by Motorola for use by the spread spectrum applicants is suitable for the type of service that TRW and the other applicants propose to offer.

In particular, neither the 1675-1710 MHz band nor the 1599.5-1610 MHz band is allocated for MSS on a worldwide basis. The higher band has significant limitations upon its use for MSS, including substantial existing use, and the National Oceanic and Atmospheric Administration has voiced extreme reservations concerning implementation of Motorola's proposal because of extensive use of the band by meteorological satellites. See Letter from Richard Barth, Director, to Chairman Alfred C. Sikes, dated June 22, 1992. In addition, use of this band would require applicants to split their uplink operations between at least two non-contiguous frequency bands, a requirement that

would impose impractical and costly design constraints on the spread spectrum applicants.

With regard to the lower band segment, TRW notes that the band is not allocated to MSS in any of the ITU's three regions. It is an act of incredible audacity for Motorola to suggest that the spread spectrum applicants should willingly accept relocation from the 1610-1626.5 MHz band, where they earned a hard-fought global co-primary allocation for MSS, to a frequency band where they could be forced permanently to cease operation at any time by any operator of a station in a primary or secondary service to which this band has been assigned.

In short, Motorola's claim that no party has offered technical or engineering support to refute the viability of its self-serving band segmentation proposal is both disingenuous and irrelevant. As TRW demonstrated more fully in an earlier riposte to this same proposal, there are more than sufficient legal and policy reasons for finding these proposals unworthy of serious consideration. See TRW's Opposition to Petition for Expedited Action, File Nos. 20-DSS-P-91(12) and CSS-91-015, et al. (filed June 24, 1992). The Motorola suggestion is so glaringly defective on its face that no useful purpose would be served in going to the expense of showing that the proposal is technically defective as well.

**III. TRW's NON-GEOSTATIONARY SPREAD SPECTRUM ODYSSEY SYSTEM
CAN SHARE SPECTRUM SUCCESSFULLY WITH EXISTING AND
PROPOSED CO-PRIMARY USERS OF THE FREQUENCY BANDS.**

A. L-Band Sharing

General concerns have been raised concerning potential sharing between MSS systems and existing users in the L-band, particularly the radio astronomy service ("RAS") and the Global Navigation Satellite System ("GLONASS"). For example, the National Academy of Sciences, through the National Research Council's Committee on Radio Frequencies ("CORF"), has reiterated several interference concerns regarding RAS that it had raised in earlier pleadings. See CORF Comments at 2-4. CORF, however, does not oppose the MSS allocation. To the contrary, based on CORF's statements and suggestions of prophylactic measures designed to achieve compatibility between RAS and MSS, there is every reason to believe that these concerns can be fully answered in the service rules proceeding in CC Docket No. 92-166. Indeed, CORF appears committed to pursuing some system of cooperation that would permit MSS uplink operations in these bands, provided that MSS transmissions can be shifted when interference to RAS ground stations might result. See CORF Comments at 2-3; TRW Comments at 23 n.11. As CORF seeks conditions on MSS use of the spectrum, but does not protest the allocation itself, its concerns should not impede the proposed allocation.

TRW has previously demonstrated its commitment to providing necessary protection to RAS. See TRW Comments at 23; Reply Comments of TRW, RM-7773, at 14-17 and Technical Appendix thereto at A-2 to A-3 (filed November 14, 1991). See also Technical Appendix hereto at A-3 to A-4. TRW renews its pledge to work with CORF and others to determine the most appropriate method of implementing these techniques.

Similarly, Odyssey or multiple Odyssey-type systems should have no difficulty coordinating and co-existing with GLONASS throughout the L-band spectrum where the global navigation system may ultimately operate. See Technical Appendix at A-2 to A-3. The trigger levels stated in Footnote 731X were negotiated at WARC-92 with the Russian Federation's direct input, and compliance with those levels should be held to provide the necessary protection both to GLONASS and the forthcoming GLONASS-M system (which may operate up to 1621.1 MHz). Nevertheless, more definitive evaluations cannot be made at this time because there is not yet sufficient data concerning GLONASS operating parameters to reach competent conclusions.^{10/}

^{10/} Despite the paucity of available information on GLONASS parameters -- both present and contemplated -- AMSC and CELSAT each make seemingly-definitive, yet contradictory, assertions regarding MSS/GLONASS compatibility. See AMSC Comments at 13 and Technical Appendix, Section I; CELSAT Comments, Appendix D. These statements must be viewed with considerable skepticism, and assigned very little weight.